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A CRITIQUE OF 'FUSION.'

By Professor I. MADISON BENTLEY, Cornell University.

Early in the last century J. F. Herbart declared that the current psychology of his time suffered from three grave deficiencies; it regarded mind as an aggregate, rather than a system; it failed to find the bonds of union among mental events; and it overlooked, in its analyses, the concurrence of mental activities. Reflection upon Herbart's own system of psychology impresses one with the fact that it was just these deficiencies that Herbart was most concerned to supply. He emphasized the organization of mind as against the aggregation of faculties; he insisted that conscious experience is a coherent system of states or conditions; and he set forth typical groupings—complications and fusions—into which ideas fall.

Different as are the concrete methods and problems of our own psychologies, Herbart's system may fairly be said to express the spirit of modern psychology. This cannot be better illustrated than by an historical and critical account of the concept of 'fusion' which owes its psychological application to Herbart.

There are three reasons why a discussion of fusion is, at the present time, desirable. The first of these is, that the enormous amount of psychological analysis of the last twenty years throws into prominence any concept that promises to bring order and organization into the multitude of the more elementary phenomena of mind; the second is, that the term 'fusion' is woefully ambiguous, possessing almost as many shades of meaning as there are psychological systems; and the third lies in the demand for a systematic setting to a mass of new experimental results.

I.

Although various mental phenomena which are now-a-days classified as 'fusions' were familiar to psychologists before Herbart's time,—we find mention of them even in Aristotle,—

the psychological use of the word 'fusion' was extremely rare. In Herbart's system the term springs into prominence through his attempt to bring the empirical data of mental experience—*Vorstellungen*—into relation to his philosophical conception of mind as a simple unitary being.¹ Without opposition, the contents of a unitary mind must be all one, lacking internal distinction; but opposition, if it be complete and unmixed, is no less incompatible than coalescence whether with the facts of experience or with a unitary soul. Now reconciliation of unity and opposition is compassed only when antithesis is counterbalanced by an act of fusion (*Verschmelzungssact*). According as ideas are more or less similar, is opposition, antagonism, more or less in abeyance, and fusion, at the same time, more or less complete.

The most important features of Herbart's doctrine are its metaphysical implications and its conception of fusion as an hypothetical act or process by means of which opposing ideas are welded. The theory is worked out most elaborately for tones. Herbart's whole theory of musical relations is historically important because it attempts what was in his time a decided novelty—a psychological explanation of tonal relations.² But quite apart from general difficulties in applying his principles of likeness and of opposition, Herbart's deductions in the sphere of audition stand at wide variance with the facts.³ Degree of fusion is not, as he maintains, a function of qualitative (pitch) likeness neither does introspection reveal any specific *act* of fusion. From these fundamental errors spring a hundred minor fallacies, which invalidate the whole theory. Herbart's attempt to bring psychological system and order into the chaos of musical theory was wholly sincere and even heroic; but he started from wrong presuppositions, and whenever these came into conflict with the facts, the facts were sacrificed and the presuppositions maintained.

¹ Herbart's *Saemtliche Werke* (Kehrbach's edition), ii, 210; iii, 102; iv, 374; v, 308, 324.

² For a searching criticism of Herbart's theory of fusion, see C. Stumpf, *Tonpsychologie*, ii (1890), 185 ff.

³ In commenting on Herbart's 'complete opposition' between a tone and its octave, Stumpf remarks that, in this case, "opposition exists only between Herbart and the facts."

Herbart's doctrine of fusion has been modified in various ways by more recent writers. T. Waitz discusses fusion quite in the spirit of his master, Herbart,—forsaking, however, mathematical deductions, and introducing somewhat freely psychophysical concepts.¹ K. Fortlage makes the amalgamation of like ideational contents one of the four general attributes of the idea.² His derivation of fusion by means of the consolidation of simple ideas is very much after the manner of Herbert Spencer's derivation of the idea from the 'cohesion' of 'vivid feelings' with like 'faint feelings'.³

Volkmann's treatment of fusion is more important. He makes fusion the union to a single act of a plurality of ideating activities. Like Herbart, Volkmann finds the reason for fusion in the simplicity of the soul.⁴ He is at pains to resolve the apparent contradiction in his master's synthesis of opposing ideas. Since unlike ideas must retain each its own identity, they cannot fuse to a single idea. But it is different with the *acts* of ideation (*Vorstellen* as distinguished from *Vorstellung*). The *acts* are not qualitatively opposed. They merely check, inhibit, each other; and their residua fuse into a single act (342). The explanation is clever, but really futile; for the inhibition of an ideating act (*die Aufhebung oder Verminderung des Bewusstwerdens einer Vorstellung*, 345) can mean only quantitative, *i. e.*, intensive diminution, and intensive diminution is entirely different from qualitative fusion which is a matter of clearness—as Volkmann, indeed, admits (346). He, confuses, nevertheless, fusion with the indistinguishableness of

¹ *Lehrbuch der Psychologie*, etc. (1849), 85 ff.

² *System der Psychologie*, i (1855), 127 ff.

³ *The Principles of Psychology*, 3rd ed. (N. Y., 1897), i, 182.

⁴ "Gleichzeitige Vorstellungen verschmelzen, d. h. ihr Vorstellen vereinigt sich zu einem einheitlichen Acte; ihr Vorstellen fliesst zusammen zu einem Bewusstsein;" *Lehrbuch der Psychologie* (1884), i, 340; cf. *Grundriss der Psych.* (1856), 103. Although V. explains fusion in terms of the simple soul, he professes, nevertheless, to derive his proof of the latter from empirical facts (*Lehrbuch*, 65 and 340). The proof rests, however, upon the assumption that every *Zustand*—every actual mental phenomenon—implies a *Traeger*, a substrate, in which it inheres. His fusion is broader than Herbart's, for it includes 'complications.'

weak impressions. An important issue of Volkmann's theory is that, since diverse qualities maintain themselves under fusion, the fused mass (*Gesammtvorstellung*)¹—although it is a single act—includes a plurality of parts (364).

The most modern defense of the Herbartian doctrine of fusion is made by Theodor Lipps. In Lipps' theory reappears the notion of two antagonistic tendencies in mind. The tendency toward self-maintenance derives from the idea itself; the tendency toward coalescence from the "limitation of mental force," a compression of ideas into a narrow 'psychical space.'² Now degree of fusion is the result of warfare of these two tendencies. Lipps departs from Herbart in one important particular. Instead of deriving fusion from the ideas themselves, he derives it from the capacity of the mind as a whole. The mind is the vehicle of a certain limited amount of force. This force is lent temporarily to a group of ideas, and can be utilized to bring these ideas to consciousness only on condition that they 'stand close' and share the limited amount of energy at their command.³ On the other hand, the conception of fusion as a means of salvation of the unitary soul is entirely Herbartian in spirit (474). A number of 'excitations' have their respective 'rights' to conscious existence (depending upon their respective

¹ It is significant that Volkmann identifies his *Gesammtvorstellung* with the 'complex idea' of the English school. At times, he has clearly in mind the epistemological function of this idea, as when he says that "total ideas are those groups of sensations of different classes by means of which we think the individual things of the external world." *Grundriss*, 103.

² *Grundtatsachen des Seelenlebens* (1883), 159, 472 ff. "Seelische Kraft" is, at bottom, an explanation in mechanical terms of the 'active' aspect of attention. Lipps' theory of fusion, which is couched in spatial and physical metaphors, is an interesting study in the psychology of types. Its 'limitation' is the limitation of visual and motor imagery. The theory is a picturesque restatement of mental facts in terms of force and magnitude. Cf. *Philos. Monatsh.*, XXVIII (1892), 547.

³ The germ of this distinction is, however, to be found in Herbart's 'Verschmelzung vor der Hemmung' and 'Verschmelzung nach der Hemmung.' The former is a function of the qualitative moment in ideas, the latter is determined by the unity of the soul. *Werke*, v, 324; cf. Volkmann, *Lehrbuch*, i, 371.

'energies'); nevertheless, it is impossible for them to come into their full conscious rights on account of the limited supply of energy at the disposal of the mind. The soul is saved from its dilemma if "the a [the several ideas of a group, *e. g.*, of tones] can be made to sacrifice their independence and to fuse. All the a are thus brought, in a way, to their rights and yet, at the same time, only so much mental force is expended as a single idea demands." The degree to which ideas may be persuaded to relinquish their claims to conscious existence depends upon their likeness,—like ideas fusing most closely,—upon their intensity, upon attention, and upon practice.

For Lipps fusion is of two kinds, 'total' and 'continuous' (*stetig*). In the former, fusion is a merging of a plurality of qualities into one,—a loss of independence. In the latter, it is the gradual transition from quality to quality which underlies either spatial perception or the apprehension of temporal position. In regard to total fusion—which is also called 'qualitative'—it is only necessary to note that fusion does not indicate any typical connection among ideas. It is simply the conquest of coalescence over independence. Continuous or gradual fusion is a different matter. It is the conscious bridge between qualities set either in spatial or temporal patterns. In Lipps' system, it stands, first, as the means for creating *space* out of slight qualitative differences in tactful and visual sensation. It is an adaptation of Lotze's theory of local signs. Suppose that there are given simultaneously three pressures, a , b and c , so similar that a would, under other circumstances, fuse totally with b and b with c , but so different that a and c would not entirely lose their independence. The three elements will form a spatial continuum of which a and c are the termini; *i. e.*, the coincidence of 'total' fusion and of slight qualitative independence gives rise to a 'continuous' fusion which underlies the perception of space.¹ Secondly, an analogous fusion of *time*,

¹ Lipps' theory of space suffers from the erroneous view that the psychological element of space is the localized point from which are to be derived in order the line, the surface and the solid:—a sheer confusion of geometry and psychology. His theory follows directly from his Herbartian principles, on the one hand, and, on the other, from the pioneer works of Johannes Mueller, E. H. Weber, Fechner and Lotze.

to which Lipps devotes but little attention, proceeds from the rapid succession of like qualities.

H. Ebbinghaus' conception of fusion is best understood in the light of Lipps. Fusion, for Ebbinghaus, means Lipps' 'total fusion,' but it is transferred from the mind to the nervous system. Nervous processes fuse, and give rise in consciousness to a single content which may, however, be broken up, analyzed, by attention. As analysis proceeds, fusion disappears. For the various degrees of unity among tonal intervals (see below Stumpf's definition of fusion), Ebbinghaus proposes a specific explanation in terms of peripheral processes in the organ of hearing.¹

Among the psychologists whom we have thus far considered, we find the same general conception of fusion. From Herbart to Lipps and Ebbinghaus we trace what may be called the traditional use of the term. When, however, we turn to C. Stumpf's interpretation of fusion, we note a radical change in the employment of the word. Stumpf's fusion is much narrower than that of the Herbartian school. It is neither a coalescence of conscious processes in general nor is it equivalent to confusion or to a lack of clearness that disappears with attention or practice. It is a 'sensuous moment' given once and for all with the sensation qualities. The peculiarity of this 'sensuous moment' is that it brings the sensations in which it inheres into a more or less close unity. That is to say, fusion is of various degrees. As Stumpf defines it, fusion is a relation (*Verhaeltnis*) of simultaneous sensations, by virtue of which sensation qualities form not only a sum but a whole (*Empfindungsganzes*); a relation which renders the impression of simultaneous sensations more like the impression of a single sensa-

¹The explanation revives an old theory of Ernst Mach's. It rests upon a modification of the Helmholtz-Hensen theory of audition, for it embodies an extension of the principle of resonance and a liberal interpretation of the doctrine of specific energies. It is not entirely satisfactory as an explanation of Stumpf's type of fusion, because it seems to place degree of fusion more or less at the mercy of relative intensities; whereas fusion, as a 'sensuous moment,' is independent of intensity. Cf. H. Ebbinghaus, *Grundzüge der Psychologie*, i (1902), 326, 481, 573.

tion than of the given sensations in mere temporal sequence.¹ Stumpf compares the fusion to the unity obtaining among the attributes or moments of a single sensation. Just as quality and intensity, or quality and extension, form parts of an inseparable whole in sensation, so do sensation qualities form parts of an inseparable whole in fusion. Although Stumpf confines his discussion almost exclusively to tones, he acknowledges fusions not only in other sense modalities but also between qualities from different senses, as the fusion of taste with smell or with temperature. The first important feature of Stumpf's fusion is, then, its sensuous nature. It is as much 'given' to mind as are the qualities themselves. The second feature is the plurality of fused parts. For Herbart, Lipps and Ebbinghaus, the typical fusion is the merging of qualities into a single quality, or the analogous physiological consolidation; but Stumpf's fusion, on the contrary, always includes a perception or a 'judgment' of multiplicity. In the third place, this last type of fusion depends solely upon the qualitative moment of sensation.² Attention does not affect it; intensity does not affect it; it changes neither with practice nor with analysis. From these three differentiating factors, the identification of fusion with consonance—so far as consonance is a matter of sensation and not of feeling—almost inevitably follows. The identification is more than hinted at in the first volume of the *Tonpsychologie*,³ but its full consequences appear only several years later.⁴ Differences of fusion are, for Stumpf, not qualitative but quantitative. Since fusion is the unitarity of a complex, degrees of fusion are degrees of unity. Among auditory fusions, the octave is the 'highest,' the sevenths among the 'lowest.' It must, however, be borne in mind—for the sake of what follows—that Stumpf, although he

¹ *Tonpsychologie*, i (1883), 101; ii (1890), 65, 127 f.

² Ebbinghaus (*op. cit.*) brings Stumpf's fusion under one of his classes of *Anschauungen*, that of *Einheit und Vielheit* (482).

³ Vol. I, 101.

⁴ *Beitrage zur Akustik und Musikwissenschaft*, I. Heft, *Konsonanz und Dissonanz* (1898). Stumpf declares (p. 35) that the close relation of fusion and consonance had been before his mind since 1880, and that it was with the problem of consonance in view that he had entered so circumstantially into the phenomena of fusion.

identifies fusion and unitariness, has in mind, not unitariness in general, but only that phase of it which is derived directly from sensation qualities.

O. Kuelpe's conception of fusion is closely related to that of Stumpf. Kuelpe, however, while he accepts Stumpf's account in general, gives the term a somewhat wider interpretation. He carries it from the special psychology of tone to general psychology. Fusion thus becomes one of the typical modes of connection among mental elements. It stands co-ordinate with 'colligation' (*Verknuepfung*), from which it is distinguished in two ways.¹ In the first place, "it is characteristic of the fusion that the elements contained in it are more difficult of analysis, of the colligation that they are easier of analysis, in connection." In the second place, fusion is a qualitative, colligation a spatial and temporal, form of connection: "if the connected elements are temporally and spatially identical, but differ in quality, their connection must be termed fusion; if they differ in duration or extension, colligation." As thus defined, fusion covers not only auditory complexes but also the mixture of color-tone and brightness, as well as emotions and impulses. Kuelpe's unwillingness to make degree of fusion independent of intensity, and of the number and pitch difference of constituent tones, shows that his fusion is not identical with Stumpf's consonance.²

In Wundt's psychology, fusion occupies a prominent place. It stands with assimilation and complication as one of the three types of 'simultaneous association.' It is of two kinds: intensive (between such homogeneous elements as tones), and extensive (the blending of visual, pressure, muscular and tendinous sensations in the consciousness of space). The common attribute of all fusions is the prominence of some one element. A typical case is the simple clang or note, with its prominent fundamental and faint overtones. When Wundt says that a fusion is dominated by a single element he means that this element stands in the focus of attention; *i. e.*, that it is apperceived while the remaining elements remain obscure.³ His

¹ *Outlines of Psychology* (1895), 276 f.

² *Ibid.*, 288.

³ *Grundzuege der physiologischen Psychologie*, 5th ed. (1902), ii, 110 f, 372.

fusion is thus a function of apperception, whereas Stumpf's is a matter of sensation.

The conception of fusion as an undifferentiated mass has been worked out in some detail by two recent writers: H. Cornelius of Munich, and E. Buch, of Copenhagen. Cornelius says of fusion, "whenever . . . a sum of part-sensations must be assumed, without being individually noticed, we shall . . . speak of the fusion of the part-sensations whether these stand together temporally or in succession."¹ Buch has practically the same notion.² There is fusion, he says, 'where a plurality of stimuli are correlated with a single idea'; that is to say, where no single stimulus gives rise to its own appropriate conscious process, but where every one contributes, nevertheless, to the 'fusion-mass.' These definitions substitute psychophysical terms for the mathematical and metaphysical terms of Herbart.

Muensterberg³ denies any special affinity in fusion; for affinity he substitutes inhibition of a greater or lesser number of the primitive elements (*Urelemente*) which compose the sensation.

II.

We have, in our historical sketch, sufficiently illustrated the wide ambiguity of the word 'fusion.' So great ambiguity in a technical term undoubtedly works mischief; it is not, however, in the present case, easy of remedy. Any attempt to clear it up is likely to be met by the objection that a new definition will of necessity be couched in the terminology of some particular system and cannot, therefore, be made acceptable to the science in general. I shall, nevertheless, propose a use of the word that is slightly different from any we have considered. This will be done both to bring out the common features in the various interpretations of fusion, and to suggest what seems to me to be the most profitable systematic employment of the term.

¹ *Psychologie als Erfahrungswissenschaft* (1897), 133; *Vjs. für wiss. Philos.*, xvi (1892), 404; xvii (1893), 30.

² *Philos. Stud.*, xv (1899-1900), 1, 183.

³ *Grundzüge der Psychologie*, i (1900), 374 f.

In a review¹ of the recent literature on 'mental arrangement,' the word 'incorporation' was suggested for those simple conscious experiences which stand nearest the analytic elements of mind. The article was a defense and an interpretation of mental analysis into elements; and, at the same time, it was an attempt to set the final results of analysis into relation with the living tissue of mind. In another connection,² I have suggested a classification of simple incorporations into 'qualitative,' 'extensive' and 'temporal.' It is the first of these three classes—the qualitative incorporation—that is now to be brought into relation with fusion.

The peculiarity of all incorporations is, first, their unitariness, their organization; and, secondly, the presence of unique characteristics which are not to be found in the incorporated elements. The specific mark of the qualitative incorporation is the direct apposition of qualities without the introduction of spatial or temporal connectives; the members are 'given together' in consciousness, and are to be distinguished only by qualitative diversity.

Now the richest variety of simple qualitative incorporations is to be found in the auditory material which Stumpf has examined in his psychology of tone. Tonal complexes display both of the marks of the incorporation,—unitariness and special attributes,—and they give us, also, the greatest number of typical qualitative connections that are to be found in any single department of mind. Nevertheless, we cannot make qualitative incorporation synonymous with fusion, if fusion is to mean consonance;³ for consonance is only one of several moments that contribute to the unity of the tonal complex. One and the same consonance,—*e. g.*, the consonance of the fifth—may display now more, now less, unitariness, depending on attention, on intensity, on practice, on the adhesion of its members to associated processes, and on other special and general

¹*Amer. Jour. of Psy.*, XIII (1902), 269.

²An article on the psychological meaning of 'clearness' to appear in the current volume of *Mind*.

³By no means all musical theorists and psychologists agree with Stumpf that consonance is the sensuous relation of pitch-qualities. Wundt, *e. g.* (*Grundzuege*, 5th ed., ii, 421), has an entirely different conception of consonance.

factors. It is true that the sensation qualities determine the type of the incorporation; but it is not true that the unity of the complex depends solely upon these qualities. This fact assumes importance when we try to determine the *degree* of incorporation. The degree of incorporation of the fifth may be regarded as a constant quantity only on condition that it depends solely on the consonant relation of the constituent tones. So far as Stumpf means by fusion consonance,—and not unity in general, as he sometimes seems to mean,—he is consistent in ascribing to the fifth an unalterable degree of fusion that places it between the octave and the fourth. Even Kuelpé, who, as we have noted, is strongly influenced by Stumpf's doctrine, hesitates, at this point, to adopt so radical a position. No one who has introspectively lived through auditory incorporations can doubt that, under constant conditions, the unity of the fifth is greater with unlike than with like intensities, greater in half-attention than in absorbed attention, greater with like than with unlike spatial localization, greater without than with visual or articulatory associations.

If we cannot identify incorporation with a fusion which means consonance, neither can we identify it with the fusion of Cornelius and Ebbinghaus which is the converse of analysis.¹ A 'fused' mass without parts, cannot, with propriety, be called an incorporation; for the latter demands individual members. An incorporation without parts is paradoxical.

But neither can we make Wundt's fusion synonymous with this type of incorporation; both because it covers space (which differs fundamentally from qualitative connections), and because it demands a dominating element.² There is, indeed, a variety of qualitative incorporations which is marked by the predominance of a single member,—the musical note is a good example,—but it is only a variety. It depends upon some accident (*e. g.*, great intensity) which attracts the attention to a certain part of the incorporation.

¹ Cornelius' fusion also covers complexes with temporally distinct parts, which would come under our temporal incorporations.

² This demand is derived, of course, from Wundt's close union of fusion and apperception.

Wundt's fusion is too much a matter of attention; it ignores the influence of sensation quality. Stumpf's fusion is too much a matter of sensation quality; it ignores the influence of attention, of intensity and of other factors in incorporation.

Now a synthesis of these two extreme accounts of fusion would give us precisely the essential features of the qualitative incorporation. It would take into consideration all the factors which contribute to unitariness, and it would take account of all the characteristics of the fused complex.

Such a synthesis must, however, recognize a striking difference between quality and attention as moments of incorporation. We have seen that both quality and attention affect the degree of incorporation. Certain qualities are clearer than others in combination; *e. g.*, the temperature and gustatory sensations in the taste of ice cream are clearer than the olfactory and gustatory sensations in the 'taste' of wine. On the other hand, *all* qualities are clearer in attention than in inattention. But there is a difference. The obscurity that depends upon quality is *dependence*; the obscurity that arises from inattention is cloudiness, indefiniteness, dullness, confusion. A *c* heard out from an octave incorporation is neither cloudy nor indefinite nor dull nor confused; it is dependent, attached, adulterated, not properly itself, and no amount of concentration upon it can deliver it from its bondage, although concentration will remove every trace of blur and confusion.

The point, then, is this, both kinds of clearness exert an influence upon the unity of a complex. There is a unity of the complex partially analyzed by attention, and there is a unity of the sensation qualities simply as given together. Moreover, unitariness arising from all other factors of synthesis—intensity, association, habituation, practice—may be reduced to one or other of these two kinds, either to qualitative dependence or to the confusion of an imperfect attention.

Now since our qualitative incorporation embodies the important features of fusion, as fusion has been interpreted by psychologists of various schools, an identification of the two concepts may, without difficulty, be effected. The identification is proposed because it relieves the term 'fusion' from its unfortunate ambiguity while it does not sacrifice—but rather

combines—the important qualities already associated with the word. Let us see what factors fusion, as qualitative incorporation, preserves to us from the various accounts examined. From the Herbartian doctrine we rescue out of the wreck of metaphysical and mathematical theory, the fact of the closer and more remote union of 'ideas'; from Stumpf we derive a mass of empirical data regarding the structure of sensation complexes; Kuelpe gives us a systematic setting of the facts, and Wundt acquaints us with the enormous influence of attention upon the synthesis of mental formations. These are all indispensable data for a complete doctrine of fusion.

The synonymous use of 'fusion' and 'qualitative incorporation' may seem, at first sight, to render unnecessary the preservation of both terms. Nevertheless, the two words should, in my opinion, be retained. If 'fusion' be elevated above its local limitations and purified of inconsistencies, there is no reason why it should be abandoned. Indeed, quite apart from intrinsic reasons, its own inertia will tend to keep it in the literature of the science. 'Qualitative incorporation,' on the other hand, as a representative form of mental synthesis, has a systematic use in the psychology of ideational complexes which it cannot delegate to the more historic term.